

FIBROUS CUMMINGTONITE IN LAKE SUPERIOR: REPLY

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Champness, Lorimer, and Zussman have correctly pointed out my nearly synonymous usage of the terms acicular, fibrous, and asbestiform. I have spent a great deal of time thinking about the differentiation of these terms, and although I agree with their statement in paragraph 2 that there is an inference of difference in the terms, I contend that there can be a complete overlap of usage of the terms at the electron microscope level. Differentiation of asbestiform from acicular and fibrous seems to depend upon where the sample comes from, e.g., asbestiform minerals from commercial deposits of asbestos can have length/breadth aspect ratios and lengths analogous to what a geologist would call fibrous in a non-commercial exposure. I have carried out numerous length/breadth and length analyses of fibrous cummingtonite from the taconite tailings and find that there is a complete overlap of the length/breadth and length distributions compared with results obtained for UICC amosite; the only exception is that the UICC amosite sample has a few longer ($>10\mu\text{m}$) fibres (2% by count) compared to taconite tailings. The term asbestiform does not seem to be used commonly by geologists who do not work with asbestos deposits.

Other arguments for and against the usage of these and other terms (even amosite) can be made, but it is more important to have a generally recognized quantitative classification for these terms. More pertinent, statistical distributions of length/breadth and length are desirable. In my paper on fibrous cummingtonite in Lake Superior (as stated), I used the minimum aspect ratio of 3:1 to include acicular, fibrous, and asbestiform. I did not state or infer that these terms were synonymous with asbestos, nor did I develop any positive or negative health significance to this usage. I do regret the use of acicular cummingtonite in place of amosite re Selikoff without further explanation.

Therefore, until rigorous definitions of acicular, asbestiform, and fibrous can be made, applied, and generally accepted, I do not accept the rigor or differentiation that Champness, Lorimer, and Zussman imply but never define. Also please note relative to the last sentences of the criticism of Champness, Lorimer, and Zussman that "asbestos" is not used in context to the Lake Superior taconite or synonymously with acicular, asbestiform, and fibrous.

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